BRITISH COLUMBIA
MINISTRY OF FORESTS

Tree Farm Licence 1

Issued to Skeena Cellulose Inc.

Rationale for Allowable Annual Cut (AAC) Determination

effective February 23, 1999

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Chief Forester

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm License (TFL) 1. This document also identifies where new or better information is required for incorporation into future determinations.

Description of the TFL

TFL 1 is located in the Skeena/Nass region of the province near the City of Terrace. North of Terrace it extends into the Nass valley, including the Ishkheenickh and Kiteen drainages. To the east it encompasses the Copper River valley and to the west the TFL includes much of the area south of the Skeena River near the mouth of the Lakelse River.

Rural communities near or within the TFL include the Tsimshian villages of Kitselas, Kitsumkalum as well as the Nisga'a villages of New Aiyansh, Gitwinksihlkw and Lax Galts'ap (Greenville). The north-west portion of TFL 1 lies within the Nisga'a Lands as identified in the Nisga'a Final Agreement and is discussed below under *First Nations*.

Much of the TFL is located east of the Coast mountains and includes rugged slopes and valleys formed by the Skeena mountains and the Nass Basin. The total land base of TFL 1 is 610 691 hectares of which 272 597 hectares (45 percent) are considered productive forest. The remaining 338 094 hectares (55 percent) are composed of non-productive areas including alpine tundra, rock, rivers and lakes, swamp, non-typed areas and existing roads. The timber harvesting land base—the area estimated to be economically and biologically available for harvesting—is approximately 130 645 hectares.

The climate is transitional and includes both maritime and continental influences. The forests of TFL 1 are distributed primarily among the Coastal Western Hemlock (CWH), Interior Cedar-Hemlock (ICH) and Mountain Hemlock (MH) biogeoclimatic zones. Forests consist predominantly of old growth stands of western hemlock and amabilis fir, with mixed stands of spruce, western redcedar and cottonwood occurring along valley bottoms.

Access to TFL 1 is via highway 16 from Smithers or Prince Rupert. Highway 234 runs north of Terrace through part of the TFL, providing access to the Nass valley. Forestry, tourism, mining and fishing are the principal economic activities in the region.

History of the AAC

The Province first awarded TFL 1 to Columbia Cellulose Company Ltd. in 1948. At the time of Management Plan (MP) No. 1, the total area of the TFL was 788 987 hectares and the company was authorized to harvest 410 597 cubic metres per year from a timber harvesting land base of 243 419 hectares. Ownership of the licence was transferred

several times during the 1960s. In 1970 the total licence area increased substantially to 2 697 697 hectares due to the amalgamation of TFLs 1 and 40. Under MP No. 5, Skeena Kraft Ltd. (the licensee at the time) was authorized to harvest 2 038 824 cubic metres per year from a timber harvesting land base of 839 530 hectares.

From 1979 to 1985 the AAC decreased significantly as a result of license amendments and corresponding land deletions from the TFL area. In 1986 TFL 1 was assigned to Skeena Cellulose Inc. A further reduction to the AAC occurred at that time —from 750 000 to 600 000 cubic metres—when TFL 1 was subdivided to create TFL 51. In 1988, the AAC was increased to 720 000 cubic metres, reflecting the addition of cottonwood stands and some marginally productive areas to the timber harvesting land base of TFL 1.

The most recent Management Plan, MP No. 8, was approved for the period January 1, 1994 to December 31, 1998, and an AAC of 720 000 cubic metres was determined. This included 29 950 cubic metres per year administered under the Small Business Forest Enterprise Program (SBFEP).

New AAC determination

Effective February 23, 1999, the new AAC for TFL 1 will be 720 000 cubic metres—the same as the current AAC. This AAC includes 29 950 cubic metres administered under the SBFEP.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for TFL 1 includes the following:

- Statement of Management Objectives, Options and Procedures (SMOOP) for Management Plan No. 9, TFL 1, accepted February 19, 1998;
- Existing stand yield tables for TFL 1, approved by BCFS Resources Inventory Branch, October 9, 1998;
- Managed stand yield tables and site index curves for TFL 1, approved by BCFS Research Branch, October 13, 1998;
- Timber Supply Analysis Information Package: TFL 1, Management Plan No. 9, Skeena Cellulose Inc. (prepared by Sterling Wood Group Inc.), accepted November 6, 1998;
- Timber Supply Analysis Report: TFL 1, Management Plan No. 9, Skeena Cellulose Inc. (prepared by Sterling Wood Group Inc.), accepted February 8, 1999;

- Twenty-Year Plan for TFL 1, accepted June 2, 1998;
- Port Edward TFL # 1, Management Plan 9, Skeena Cellulose Inc., submitted November 24, 1998, approved December 17, 1998;
- Public input solicited by the licensee regarding the contents of Management Plan No. 9;
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives regarding visual resources;
- Memorandum from the Deputy Ministers of Forests, and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts of biodiversity management on timber supply;
- Memorandum from the Chief Forester and Assistant Deputy Minister of Environment, Lands and Parks regarding procedures for identifying and approving existing ungulate winter ranges, dated August 6, 1998;
- Technical information provided through correspondence and communication among staff from the British Columbia Forest Service (BCFS) and the Ministry of Environment, Lands and Parks (MELP);
- Technical review and evaluation of current operating conditions through comprehensive discussions with BCFS and MELP staff, including the AAC determination meeting held in Victoria on January 28, 1999;
- *Forest Practices Code of British Columbia Act*, (as amended);
- *Forest Practices Code of British Columbia Act Regulations*, (as amended);
- *Forest Practices Code of British Columbia* Guidebooks, BCFS and MELP;
- *Forest Practices Code, Timber Supply Analysis 1996*, BCFS and MELP;
- Nisga'a Final Agreement, initialed by the Government of Canada, Province of B.C. and the Nisga'a' Nation, August 4, 1998.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires me as chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide the complete answer or solution to forest management problems such as AAC determination. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information I must consider in AAC determinations.

In making the AAC determination for TFL 1, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for timber supply areas (TSAs) and TFLs. Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code* (the Code).

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although the Code is now fully implemented following the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination I take this uncertainty into account to the extent possible in the context of the best available information.

As British Columbia progresses toward completion of strategic land use plans, the eventual timber supply impacts associated with the land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for sub-regional plans, the Protected Areas Strategy or the Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will eventually result from land-use decisions that have not yet been taken by government. Thus I do not consider the possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made land-use decisions—such as the 1994 Vancouver Island Land Use Plan (VILUP)—it may not always be possible to analyze the full timber supply impact in an AAC determination. In most cases, government's land-use decision must be followed by detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. The legislated

requirement for five–year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

Forest Renewal BC is funding a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine all the AACs in the province—many of which were outdated—between 1992 and 1996. In any case, the data and models available today are superior to those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information and taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within TFL 1. I am also aware of the current treaty process involving the Nisga'a Tribal Council and the federal and provincial governments, and have discussed this below under *First Nations*.

Overall, in making AAC determinations, I am mindful of my obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests (MOF) as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under the *Forest Practices Code of British Columbia Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs. For TFLs, the analysis work is carried out by licensees and reviewed and approved by BCFS staff.

For each AAC determination a timber supply analysis is carried out using an information package including data and information from three categories: land base inventory, timber growth and yield, and management practices. Using this set of data, and a computer model, timber supply forecasts are produced. These include sensitivity analyses to assess the timber supply effects of uncertainties or changes in various assumptions around a baseline option, normally referred to as the "base case" forecast.

The base case forecast may incorporate information about which there is some uncertainty. Its validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer model used to generate it. Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current information available about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, such as the enactment of the *Forest Practices Code*, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgements that may in part be based on uncertain information are essentially qualitative in nature and, as such, subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber Supply Analysis

The timber supply analysis for TFL 1 was conducted by Sterling Wood Group Inc. (the "consultant") on behalf of Skeena Cellulose Inc. The consultant used a proprietary computer simulation forest estate model called TREEFARM. Based on previous

experience examining results from this model, as well as my staff's review of the model, I am satisfied that it is capable of providing a reasonable projection of timber supply.

The timber supply analysis provided by the licensee presented several analysis options based on a combination of management and land base assumptions. The licensee's "current management option" aimed to reflect the management regime currently practiced on the TFL. This option applied accepted site index adjustments to old growth (older than 140 years) hemlock stands in the CWH biogeoclimatic zone, and also used interim site index equations to adjust the site index of old-growth stands other than hemlock. For this determination, the base case (as described above in "The role of the base case") the latter series of site index adjustments was removed and considered as a sensitivity analysis. This is further discussed below under *site productivity*.

For TFL 1, the base case projected an initial harvest rate of 720 000 cubic metres per year—the same as the existing AAC. In the base case, the initial harvest level is maintained for two decades, followed by a decline of ten percent per decade for four decades to 470 844 cubic metres per year in decade five. This harvest level is maintained for two decades and then reduced to 423 310 cubic metres per year in decade eight and maintained for eleven decades. The harvest flow then rises in decade 18 to reach a long term harvest level of 470 844 cubic metres per year.

In the timber supply analysis, sensitivity analyses were provided to assess the risk to timber supply resulting from uncertainty in data assumptions and estimates, and these have assisted me in considering the factors leading to my determination. As discussed and qualified below, I am satisfied that the base case provides a suitable reference point from which to assess the timber supply for this determination.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (7)

In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area

Land base contributing to timber harvest

- *general comments*

The total area of TFL 1 as reported in the timber supply analysis is 610 691 hectares. The productive forested areas, excluding non-forest, non-productive areas, non-commercial brush and existing roads, account for 272 597 hectares, or approximately 45 percent of the total TFL area.

As part of the process used to define the timber harvesting land base, a series of deductions was made from the productive forest land base. These deductions account for factors which reduce the forest area available for harvesting for economic or ecological reasons. In timber supply analysis, assumptions and if necessary, projections, must be made about these factors prior to quantifying appropriate areas to be deducted from the productive forest area in order to derive the timber harvesting land base. For TFL 1, the timber harvesting land base used in the base case harvest forecast was 130 645 hectares, or approximately 21 percent of the TFL area. Specific land base reduction factors and the supporting assumptions are described below.

In reviewing this process I am aware that some areas may have more than one classification—for example, environmentally sensitive areas (ESAs) may also lie within riparian areas. To ensure the accuracy of the timber harvesting land base derivation, it is imperative that no deduction be made more than once in respect of the same area of land, by virtue of it or of some part of it coming under more than one classification for timber supply analysis purposes. Hence, the deduction reported in the analysis or the AAC rationale for a given factor does not necessarily reflect the total area with that classification; some portion of it may have been deducted earlier under another classification. I acknowledge the above approach was used in the licensee's timber supply analysis to appropriately determine the timber harvesting land base of TFL 1 and find the results to be reasonable.

- *TFL area adjustment*

A recent review of the TFL area by BCFS and SCI staff suggests that the area used in the analysis does not exactly match the area derived from the existing legal description of

TFL 1. The preliminary review indicated that the area used in the analysis may be overestimated by up to 4223 hectares or 0.7 percent of the total TFL area.

While the precise impact on the timber harvesting land base is uncertain, SCI staff indicate that much of the area involves alpine and inoperable areas. Therefore the timber harvesting land base will be impacted by a proportionately smaller amount compared to the non-productive areas of the TFL. Nevertheless, because of this uncertainty I note that the base case harvest forecast may be overestimated by a small but unknown amount and have considered this below in my "Reasons for decision". In cooperation with BCFS Resource Tenures and Engineering Branch staff, I request that the licensee review the boundaries and area of the TFL, and clarify any discrepancies with the legal description of the TFL before the next determination.

- non-forest and non-productive areas

Non-forested areas on TFL 1 include alpine areas, lakes, rock, brush and other non-productive areas. Based on the TFL inventory, 321 055 hectares of non-forested, 17 039 hectares of non-productive areas and 2 527 hectares classified as alpine tundra, were deducted from the land base. Standard procedures were followed in the analysis to exclude these areas.

- physical operability

The size of the TFL 1 timber harvesting land base identified by the licensee is limited by physical and economic constraints. For the timber supply analysis, the licensee employed 1998 operability mapping to assess the TFL for areas physically accessible to harvesting operations. The mapping identified four operability classes including conventional, non-conventional, low volume and non-harvestable stands. In deriving the timber harvesting land base for this analysis, the licensee included 14 782 hectares of areas classified as non-conventional based on leading species, age and height class, stocking and site index. SCI excluded 84 435 hectares of productive forest from the timber harvesting land base to account for inoperable areas.

I note that during the term of MP No. 8 the licensee's operations included significant harvesting in areas categorized as non-conventional and low volume. BCFS Kalum Forest District staff have reviewed the approach used to classify operability and consider the estimates appropriate for use in the base case. Having reviewed the licensee's criteria and assumptions, I accept the information as the best available and suitable for this determination.

- non-commercial cover

In the analysis, the licensee excluded 1008 hectares of areas occupied by non-commercial brush species. SCI currently does not plan to convert these sites to productive commercial forest. They were therefore appropriately removed from the timber harvesting land base.

- low site

TFL 1 includes a high proportion of low productivity areas which are not expected to contribute to timber harvesting. To account for areas that will not be harvested because of low site quality, the licensee reviewed the criteria used in the timber supply analysis for the adjacent Kalum TSA. For TFL 1, site index limits were similarly applied by leading species and Forest Inventory Zone. The licensee consequently excluded 11 517 hectares from contributing to the timber harvesting land base. BCFS District staff have reviewed the criteria used and agree they apply to TFL 1. I have examined the licensee's assumptions and the information used to account for low site, and find them acceptable for use in this determination.

- deciduous forest types

The productive area on the TFL includes 6901 hectares of deciduous-leading stands. With the exception of 2909 hectares of cottonwood-leading stands, the licensee deducted all deciduous-leading stands from contributing to the timber harvesting land base.

In the timber supply analysis, the minor deciduous component of coniferous-leading stands was included in the volume projections for TFL 1. However, only cottonwood is recovered during the licensee's harvesting operations. SCI has harvested approximately 2500 cubic metres of cottonwood stands during the past five years. Current practice on TFL 1 is to harvest cottonwood periodically depending on market conditions.

I note that the licensee's commitment to managing cottonwood stands and acknowledge that the viability of harvesting cottonwood is subject to fluctuating market conditions. I note the extent of hardwoods other than cottonwood in coniferous-leading stands represents a very small proportion of the existing volume on TFL 1 (approximately 0.3 percent of the current standing volume). Any uncertainty regarding the utilization of these species will have a negligible downward impact on the base case harvest forecast. For these reasons, I accept the information as modelled as reasonable for use in this determination.

Given the unpredictable nature of fluctuating markets and the fact that the total area of cottonwood is only slightly over two percent of the timber harvesting land base, I do not find it reasonable or necessary to partition the harvest at this time. However I request that the licensee review the utilization of cottonwood and the contribution of cottonwood-leading stands to the timber harvesting land base before the next analysis.

- environmentally sensitive areas (ESAs)

Some areas are environmentally sensitive or significantly valuable for resources other than timber. SCI assessed ESAs for sensitive soils, recreation, regeneration difficulties and avalanche-prone areas. The proportions of these areas that were deducted from the timber harvesting land base were based on assumptions used in developing the 1998 timber supply analysis data package for the adjacent Kalum TSA.

Based on the above information, the licensee excluded 15 991 hectares of ESAs on the productive forest land base when defining the timber harvesting land base. Details of specific sensitive site categories are considered later in the section entitled, Integrated Resource Management Objectives.

- non-merchantable stands

In the timber supply analysis a total of 30 991 hectares was deducted from the productive land base to account for areas occupied by stands of low volume and quality which are uneconomical to harvest. To derive this estimate, SCI used the same stand age, height and crown closure criteria that were used in the 1998 timber supply analysis data package for the adjacent Kalum TSA. BCFS Kalum District staff note that the assumptions used broadly reflect current practices on TFL 1. I have reviewed the criteria and the method used to account for non-merchantable stands and find them suitable for use in this determination.

- proposed protected areas

Approximately 16 304 hectares within the Kitsumkalum drainage have been proposed as a protected area through the Kalum Land and Resource Management Planning (LRMP) process. Approximately 5862 hectares of productive forest on TFL 1 are located within this proposed protected area. Current practice is to avoid these areas during harvest planning until the full LRMP agreement is submitted to Cabinet for final approval.

Consistent with my Guiding Principles, I am unable to speculate on the possible outcome and timber supply implications of anticipated or proposed land use decisions. However, if the area is ultimately protected, its contribution to timber supply will be accounted for at the next AAC determination following that designation. In the meantime, I must consider this area as part of the TFL and as containing forests which historically have and currently contribute to timber supply. Therefore, with respect to protected areas, I conclude that the base case harvest forecast underestimates timber supply by approximately one percent in the medium to long term and have discussed this below in my "Reasons for decision".

- estimates for roads, trails and landings

In estimating this deduction, the licensee considered two separate components. Firstly, roads, trails and landings that were classified in the TFL 1 inventory totaled 5183 hectares. These areas were excluded from the timber harvesting land base as part of the non-forest deductions described above under *non-forest and non-productive areas.*

The second component involved unclassified roads, trails and landings. To derive the appropriate deduction, the licensee assumed that six percent of the area of stands less than age 35 were occupied by existing roads. SCI thus excluded an additional 2733 hectares from the timber harvesting land base to account for unclassified roads, trails and landings. Based on their knowledge of local conditions, BCFS Kalum District staff agree that the

assumptions and estimates are reasonable. Having reviewed the estimates, I am also satisfied that the reductions used are acceptable and, in the absence of better information, find them suitable for this determination.

In deriving a deduction for *future* roads, trails and landings, the licensee assumed that future impacts would be similar to current practice. As a result, the licensee deducted six percent (6184 hectares) of the current timber harvesting land base covered by stands older than age 35. In the timber supply analysis, the deduction was made as a one-time reduction, prorated across all analysis units in decade ten of the forecast period.

BCFS District staff concur with the magnitude of the reduction made for future roads, trails and landings. I find the method used provides a reasonable estimate of the long-term effect of future losses and is therefore acceptable for use in this determination.

Existing forest inventory

- *inventory audit*

The current forest inventory was completed in 1992 and updated for disturbance and growth to January 1, 1997. BCFS Resources Inventory Branch conducted an audit of the inventory in 1995. The objective was to test the overall accuracy of the estimate of the total volume of existing stands on TFL 1.

The inventory audit report indicated that there was no statistical difference between the average volume per hectare generated by the BCFS Variable Density Yield Projection model (VDYP) and the volume per hectare calculated using audit procedures. However, SCI re-analyzed the information reported in the audit and found that using VDYP to generate existing stand volumes produced an average volume per hectare of stands older than age 60 that was 19 percent higher than the volumes reported in the inventory audit. SCI's consultant and BCFS specialists reviewed this discrepancy and attribute much of the difference to the use of broad species codes during compilation of the audit report. TFL 1 encompasses both interior and coastal Forest Inventory Zones and for the comparison of the average volume per hectare generated using VDYP to the volume per hectare calculated using the audit procedures, some coastal balsam stands were inadvertently assigned to the less productive interior zone rather than the coastal zone.

To reflect the audit results in the timber supply analysis, the licensee reduced by 19 percent the inventory volumes generated by VDYP for older stands. I acknowledge that adjusting all of the components of the inventory by the overall average discrepancy identified through the inventory audit may not provide the precise impacts on the harvest forecast that would be experienced if each component was adjusted by the amount it contributed to the discrepancy.

Having considered the uncertainty in applying a broad inventory adjustment without detailed consideration of each component, I nevertheless conclude that adjusting the inventory to match the results of the audit provides a better accounting of the total

existing TFL inventory volume than using the unadjusted inventory. Therefore, for this determination I accept the adjustments applied by SCI. I have discussed this further below under *volume estimates for existing stands.*

- age-class distribution and species profile

Approximately 55 percent of the timber harvesting land base is covered by stands more than 250 years old. These stands represent the most abundant age class on TFL 1. In addition, seven percent of stands on the timber harvesting land base are between 140 and 250 years old, seven percent are between 80 and 140 years old, and 31 percent are younger than 80 years.

The forests of TFL 1 consist predominately of hemlock- and balsam-leading stands. Hemlock, balsam and spruce contribute 66, 26, and four percent respectively of the current volume on the timber harvesting land base. The balance is comprised of small components of cedar, pine and cottonwood.

Expected rate of growth

- aggregation procedures

For the timber supply analysis, the inventory for TFL 1 was aggregated into analysis units based on species composition, site productivity, age and location. Stands over age 140 years were separated from stands under age 140 years to better account for differences in site productivity estimates which are more difficult to estimate in older stands. The licensee used four site productivity classes. Analysis units were also separated by Forest Inventory Zone to better reflect the different growth patterns of coast and interior forest types which both occur on the TFL. The aggregation procedures used follow acceptable procedures and I find them suitable for this determination.

- volume estimates for existing stands

The licensee used the VDYP model to generate volume estimates for existing stands over 20 years old. For stands older than 60 years, where available, the licensee used average inventory volumes and reduced them by 19 percent to account for the inventory audit results (as described above under *inventory audit*). Where the average inventory volumes were not available, VDYP-generated yield tables were used to estimate the volume of existing stands but were inadvertently not reduced by 19 percent.

The licensee provided a sensitivity analysis to demonstrate the impact on the base case harvest forecast of not adjusting the VDYP-generated volumes by 19 percent. The results indicate a small medium-term reduction to the base case forecast. I note there are no short-term implications to the base case harvest flow and acknowledge that more comprehensive modeling may indeed show there is no medium-term risk to timber supply as a result of the unadjusted yield tables. Nevertheless, in making my determination, I have considered the likelihood that existing stand yields are likely overestimated by a small amount and have discussed this below under "Reasons for decision".

- volume estimates for regenerated stands

SCI developed volume estimates for existing stands less than 20 years old and all future regenerated stands using the Table Interpolation Program for Stand Yields (TIPSY). Future stands were assumed to regenerate to the same species composition as existing stands. Standard procedures were used in the timber supply analysis.

The license provided a sensitivity analysis to show the impacts of varying regenerated stand yields by 10 percent. Increasing the estimates of regenerated stand volume increases medium-term harvest forecast in the base case; decreasing the estimates acts to reduce timber supply in the medium-term. However, I have no evidence that suggests these volumes are either over- or under-estimated.

While there is uncertainty in the estimates of site productivity (discussed below), I am satisfied that the methods and assumptions regarding regenerated stands used in the base case to estimate managed stand volumes appropriately represent past, current and foreseeable future management, and are based on suitable growth models. I therefore find them acceptable for use in this determination.

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand, expressed in terms of a site index. For a given forest stand, the site index is based on the height of the stand as a function of its age. The productivity of a site largely determines how quickly the trees on it will grow, and therefore affects the time seedlings will take to reach green-up conditions, as well as the volumes of timber that will grow, and the age at which a stand will satisfy mature forest cover requirements and reach a merchantable size or a minimum harvestable age.

In general, forest stands between 30 and 140 years of age provide the most accurate measurement of site productivity. Site indices determined from younger stands, and older stands that may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation as it does site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—known as the old-growth site index (OGSI) project—suggest that actual site indices may be higher than those indicated by existing data from mature forests.

For the TFL 1 base case, site index was assigned to stands younger than 30 years based on leading species and assumed the range of site indexes present in stands aged 30 to 140 years would be reflected in these young stands. For stands aged 30 to 140 years, site index was assigned using standard BCFS site curves with no adjustment upon

regeneration. For existing stands older than age 140 years, standard BCFS site curves were used.

In the base case, the application of site index adjustments for regenerating stands currently older than age 140 varied by species. For hemlock, the licensee applied published OGSI adjustments using procedures outlined in the BCFS report "Site index adjustments for Old-growth Coastal Western Hemlock Stands in the Kalum Forest District". In the base case no adjustments were made for other species.

The licensee provided a sensitivity analysis to show the impact on timber supply of applying general provincial OGSI adjustment equations to all stands older than age 140. The analysis suggested potential increases in the medium- and long-term timber supply of 24 and 11 percent respectively compared to the base case harvest forecast.

Based on the findings of OGSI studies and results of sensitivity analyses elsewhere in the province, I accept that there is a high likelihood that future stand yields may be significantly underestimated in the medium- and long-term and I have considered this below in my "Reasons for decision".

- operational adjustment factors (OAFs)

To account for the loss of timber volume due to operational conditions, the licensee applied standard Operational Adjustment Factors (OAFs) to the yield projections for regenerated stands used in the timber supply analysis. SCI applied a 15 percent OAF for unmapped stand openings (OAF 1) and a five percent OAF to account for decay and age-related losses such as waste and breakage during harvest (OAF 2). Standard procedures were used and I accept the licensee's assumptions regarding OAFs as appropriate for use in this determination

- minimum harvestable ages

Minimum harvestable age is an estimate of the earliest age at which a stand will reach a harvestable condition. Changing the minimum harvestable age generally affects when second growth will be available for harvest and, accordingly, the rate at which existing stands may be harvested. In practice, many forest stands will be harvested at different ages than the minimum due to constraints on harvesting which arise from managing for other forest values such as visual quality, wildlife and other operational considerations.

In the TFL 1 timber supply analysis, minimum harvestable ages were established based on minimum stand volume criteria. Minimum harvest age was assumed to occur when stands attained an average volume of 200 cubic metres per hectare for cottonwood and 250 cubic metres for all other species. A sensitivity analysis showed no impact on the base case harvest forecast when minimum harvest ages were decreased by 10 years. Increasing minimum harvest age by ten years produced a small reduction to the medium-term base case projection.

I acknowledge that predicting the age at which stands may be harvested in the future is difficult and subject to considerable uncertainty. Having considered the minimum volume criteria which were applied in the analysis, I accept the minimum harvestable ages modelled in the base case as satisfactory for use in this analysis.

- *harvest profile*

The timber supply model TREEFARM enables a preferred harvest profile to be established for the simulation period. In the base case, initially the licensee targeted stands for harvest which were over age 140 and in proportion to their occurrence in the inventory. In the medium- and long-term the profile changed to harvesting the oldest stands first in accordance with a preferred species profile. I have reviewed the approach used in the analysis and find it suitable for this determination.

(ii) the expected time that it will take the forest to become re-established on the area following denudation:

Regeneration delay

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In the timber supply analysis for TFL 1, coniferous stands were assumed to regenerate both through planting and natural regeneration. For planted stands the licensee applied a three-year regeneration delay and assumed two-year old seedlings would be used as planting stock.

For naturally-regenerated stands, SCI applied a six-year regeneration delay as well as a two-year germination period to account for the period between harvesting and the time new stands become established. Yield tables were adjusted accordingly. BCFS Kalum District staff agree with the regeneration delays used but note that one-year old rather than two-year old planting stock is typically used for regeneration.

For cottonwood, no special accounting for regeneration delay, germination period or age of planting stock was applied in the analysis. Regeneration was assumed to occur within the same year of harvesting. BCFS Kalum District staff find these assumptions consistent with current practice.

I have reviewed the assumptions used for regeneration delay. While I acknowledge that in practice, the age of planted stock is approximately one year younger than assumed in the analysis, I note that the combined impact of increasing the regeneration delay on the base case harvest forecast by one year would be insignificant. I therefore find the assumptions regarding regeneration delay as adequate for this determination and have made no further adjustments.

Not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are areas of productive forest land that have been denuded and have failed, partially or completely, to regenerate either naturally or by planting or seeding to the specified or desired free growing standards for the site. These areas consist of "backlog" NSR areas—areas in which harvesting or other disturbance occurred before 1987—and "current" NSR.

There are approximately 2189 hectares of NSR areas on the timber harvesting land base of TFL 1. The licensee has committed to reforest all NSR areas by the year 2000. However, in the timber supply analysis the model did not account for the regeneration of these areas until after the first decade. This effectively omits these areas from contributing to the timber harvesting land base for a ten year period in the analysis and may also impact forest cover requirements and the time when adjacent stands become available for harvest.

However, I have reviewed the above information and considered the results of a sensitivity analysis which increased and decreased the area of the timber harvesting land by ten percent. As a result of this review, I have observed that forest cover requirements are less constraining in the General and Integrated Resources Management (IRM) zones and that these zones comprise approximately 70 percent of the TFL. While it is possible that assuming the NSR will not be regenerated until the end of year ten may constrain areas from contributing to timber supply, the affected area represents a small proportion of the TFL and presents no significant risk to the short-term harvest forecast in the base case. I therefore accept the accounting of NSR areas as suitable for use in this determination but request that the licensee review modelling procedures for NSR areas before the next determination.

Impediments to prompt regeneration

Approximately 43 621 hectares of areas where regeneration is difficult to establish (Ep1 and Esp1) were identified and appropriately excluded from the timber harvesting land base. The licensee identified an additional 8261 hectares of areas where regeneration of stands is moderately difficult (Ep2 and Esp2) and deducted 50 percent of this area. BCFS Kalum District staff agree with the deductions applied in the base case. Having reviewed the assumptions used in the analysis, I accept the estimates of difficult to regenerate areas as suitable for this determination.

(iii) silvicultural treatments to be applied to the area:

Silvicultural systems

Clearcutting with reserves is currently the silvicultural system practiced on TFL 1. Reserves are intended to contribute to wildlife, riparian, visual and biodiversity values. In the timber supply analysis, a clearcutting system was assumed both for deriving timber yield estimates and for representing stand regeneration. I accept the information

modelled as adequately reflecting current management on the TFL and find it suitable for this determination. I note that the licensee also accounted for wildlife tree patches in the analysis and I have discussed this below under *stand-level biodiversity*.

Basic silviculture

Basic silviculture on TFL 1 includes site preparation, planting of suitable species, and treatments (e.g., brushing) to ensure that regenerated areas achieve free-growing status within a specified time. In the timber supply analysis, stands other than balsam-leading stands were assumed to be regenerated to the pre-harvest species composition through planting and natural regeneration. Balsam stands were assumed to regenerate to a 60 percent hemlock—40 percent balsam species mix. The licensee assumed initial stocking of 1400 stems per hectare for planted stands and 4000 stems per hectare for naturally-regenerated stands. BCFS Kalum District staff indicate that the assumptions used in the analysis adequately reflect current practice. Having reviewed this information, I find these assumptions to be suitable for use in this determination.

Intensive silviculture

No intensive silviculture treatments were explicitly modelled in the timber supply analysis. Currently no genetically-improved seed is used on TFL 1. While limited fertilization trials have been conducted on the TFL, the licensee currently has no plans for an operational fertilization program. Fertilization was therefore appropriately not modelled in the base case.

SCI employs juvenile spacing as part of its enhanced silviculture program. Approximately 1000 hectares of hemlock and balsam stands are spaced annually. While the base case included no specific accounting for juvenile spacing, I note that a comparison of yield curves generated using the Table Interpolation Program for Stand Yields (TIPSY) for spaced and unspaced stands showed no significant difference in projected stand volumes. Furthermore, I note that the analysis already assumed density control on planted sites, and reasonably low densities on naturally regenerated sites.

SCI has conducted approximately 220 hectares of commercial thinning on TFL 1 since 1994. Commercial thinning involves the harvesting, in a maturing stand, of trees large enough to be considered a commercial product. The licensee proposes a moderate expansion of this program over the next several years. However, commercial thinning was not explicitly modelled in the base case.

I acknowledge that SCI's proposed commercial thinning program may create additional harvesting flexibility, encourage employment, and further integrated resource management objectives. While I note that single-entry commercial thinning regimes do not generally increase the yield of specific stands, they can provide opportunities to harvest timber in areas where harvesting must be limited to meet a variety of other resource objectives.

I find that more explicit modelling of past and current intensive silviculture activities on TFL 1 is unlikely to alter yield projections enough to change the base case harvest forecast significantly, and I therefore have made no further adjustments.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area;

Utilization standards

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. These standards were incorporated into the timber supply analysis for TFL 1 to estimate minimum merchantable stand volume. To derive stand volumes, a 30-centimetre stump height and a 10-centimetre top diameter-inside-bark were assumed in the analysis. The licensee assumed a 22.5-centimetre minimum diameter-at-breast-height (dbh) for cottonwood and a 17.5-centimetre dbh for all other species.

I find the utilization standards used in the analysis are consistent both with current operational practice and provincial standards, and I find them reasonable for use in this determination.

Decay, waste and breakage

To account for decay, waste and breakage, the licensee applied data specific to the TFL area (Special Cruises #301 and #169) to the VDYP growth and yield model used to generate stand volumes. The approach was reviewed and accepted for use in this timber supply analysis by staff of the BCFS Resources Inventory Branch.

I consider the estimates for decay, waste and breakage used in the timber supply analysis to reflect the best available information for this area and therefore accept them for use in the determination.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production;

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

- non-timber resource inventories and assessments

Non-timber resource inventories have been reviewed and accepted by BCFS Prince Rupert Region and Kalum District staff. These inventories were used in developing data assumptions for the timber supply analysis as further discussed below under the appropriate sections.

- sensitive soils

Environmentally sensitive soils identified on the TFL are classified as highly unstable or moderately unstable and sensitive to disturbance. In the base case, 50 percent of each area with highly sensitive soils (Es1) and 30 percent of each area with moderately sensitive soils (Es2) were excluded from the timber harvesting land base. In addition, 30 or 50 percent of each ESA classified as sensitive due to combined soils and regeneration or hydrologic considerations were deducted, depending on the degree of sensitivity. Overall, 9383 hectares were deducted from the total productive forest to account for sensitive soils.

Because some reduction factors appeared low compared to those applied in other coastal units, I requested the BCFS Regional Research Geomorphologist to review the assumptions used in the base case. He found the 30 percent reduction for Es2 areas to be adequate, but because of the delineation of active failing and highly unstable terrain represented in the Es1 areas, the regional geomorphologist considers an 80 percent rather than a 50 percent reduction to be more appropriate for Es1 areas. However, I note that in the analysis when overlapping deductions were considered, the effective reduction to Es1 areas was 77 percent, very close to the level recommended by the regional geomorphologist. As a result, I find the deductions applied to account for sensitive soils to be adequate for this determination and have made no further adjustments. I acknowledge that the licensee has recently initiated terrain stability mapping on TFL 1 and request that any new information be incorporated into the next analysis.

- avalanche considerations

TFL 1 includes mountainous terrain which is prone to avalanches. After other overlapping deductions, 31 hectares of productive forest were identified as being sensitive to avalanches and excluded from the timber harvesting land base. The reductions reasonably reflect existing information and practice and I accept them as suitable for this determination.

- archaeological sites

A heritage resource overview was completed in 1995. Old house pits were identified in two proposed cutblocks and the licensee modified its logging plans accordingly. BCFS staff also completed an Archaeological Overview Assessment of the Kalum District in 1996. Fifteen archaeological sites each covering less than 0.25 hectares were located.

While the areas identified by the assessments were not explicitly accounted for in the timber supply analysis, I note that the combined area of the sites is very small compared to the timber harvesting land base. For timber supply analysis purposes removal of these areas would have a negligible impact on the base case harvest forecast. However, I anticipate that more detailed assessments will continue to be completed during the next management plan period. If the results of these assessments indicate the need to exclude additional archaeological sites from the timber harvesting land base, the impact on timber supply will be considered in future AAC determinations. In the meantime and over the course of MP No. 9, I expect these resources to be identified and properly respected during harvest operations.

- recreation

A variety of recreational opportunities are available to the public on TFL 1. Popular activities include fishing, hunting, camping and snowmobiling. The licensee's 1987 recreation inventory was updated in 1997 and has been approved by BCFS Prince Rupert Regional staff. In the timber supply analysis, 427 hectares were excluded from the timber harvesting land base to account for recreation areas.

District staff have reviewed the deductions made for recreation areas and agree with the assumptions made by the licensee. For the purposes of this determination, I am satisfied that the licensee has adequately accounted for recreation concerns.

- wildlife habitat

TFL 1 supports a great diversity of fish and wildlife species and habitats including moose, black-tailed deer, mountain goat and black bear as well as small mammals, furbearers and numerous bird and invertebrate species.

Areas important to wildlife were identified in the licensee's ESA inventory and appropriately excluded from the timber harvesting land base. In addition, SCI delineated a 64 396 hectare wildlife management zone which includes 17 917 hectares of the timber harvesting land base. Forest cover requirements were applied to this zone in the base case to simulate wildlife habitat requirements. In the analysis no more than seven percent of productive forest area in this zone was permitted to be covered with stands less than five metres tall. While the BC Environment staff expressed concern that the forest cover requirements may not adequately account for wildlife habitat requirements, no other information was available at the time of the analysis.

While the biodiversity and riparian provisions of the *Forest Practices Code* are intended to provide for the needs of most wildlife species, some species that are considered by BC Environment Wildlife Branch to be "at risk" require special management practices. The province's recently-released *Identified Wildlife Management Strategy* (the "Strategy") provides direction for managing critical habitat for identified wildlife species that are established through the *Forest Practices Code of British Columbia Act*.

Identified wildlife species are known to inhabit areas within TFL 1. However, to date no information specific to their occurrence on the TFL is available for these species nor were explicit measures applied in the base case to account for them.

I note that government has set an overall provincial limit of one percent on the allowable impact on the short-term timber harvest level from implementing measures for identified wildlife. For administrative purposes this impact will be measured in ter of the associated change in net land base area, which will be limited to a one-percent reduction.

While I am currently uncertain about the extent of habitat area that will be required within the TFL 1 timber harvesting land base to implement the *Strategy*, I am however, mindful that some of the referenced species are likely to inhabit the area. Since the analysis made no provision for the *Strategy*, the medium- and long-term harvest levels may be up to one percent lower than projected in the base case. I have considered this below in "Reasons for decision".

As the province implements its strategy for the management of species at risk, I expect the specific implications to be reflected in future timber supply analyses for TFL 1 and these will be taken into account in future AAC determinations. I encourage the licensee, in cooperation with BC Environment staff to begin the identification, inventory and mapping of critical wildlife habitats including those for identified wildlife species. Such information will reduce uncertainty in the management of these species and allow assessment of the implications of wildlife management in future timber supply analyses.

- *riparian habitat*

Riparian habitats occur along streams and around lakes and wetlands. The *Forest Practices Code* requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, as well as riparian management zones (RMZs) that restrict timber harvesting in order to protect riparian and aquatic habitats. The timber supply analysis for TFL 1 explicitly accounted for the protection of riparian resources in three ways. Firstly, the licensee's ESA inventory identified 289 hectares of areas that are moderately sensitive because of hydrologic conditions. Depending on the specific ESA classification, the licensee assumed that a proportion (30 or 50 percent) of these sensitive areas would not contribute to the timber harvesting land base.

Secondly, SCI used their existing Coastal Fish-Forestry Guidelines classification to develop three broad stream classes and assigned corresponding riparian reserve and management zone widths. The licensee used these assumptions and a computer mapping (GIS) system, to estimate 11 846 hectares of RRZ's and 27 824 hectares of RMZs on the TFL. Using standard procedures, the licensee excluded all the area in RRZs and ten percent of the area in RMZs from the timber harvesting land base to account for riparian resources.

The licensee also delineated a broader Riparian Resource Management Zone—not to be confused with the RMZ defined by the *Riparian Management Area Guidebook*—to

account for areas of continuous high moisture content on the TFL. The licensee applied specific forest cover constraints to 12 660 hectares of productive forest land base within this zone. According to the licensee, the objective of identifying this zone was to minimize or prevent impacts of forestry operations on fish and riparian habitat and to incorporate elements of biodiversity and wildlife management.

I find that the method used by the licensee in the timber supply analysis provides a reasonable accounting of riparian areas on TFL 1. I have reviewed and considered the modelling assumptions and have compared them to the requirements of the *Forest Practices Code*. While the approach used to estimate RRZs and RMAs is based on older Coastal Fish Forestry Guidelines information, I have concluded that the resulting deductions adequately simulate current *Forest Practices Code* requirements. Nevertheless, while I accept this approach from a modelling perspective, it is noted that the licensee is in fact obligated to manage riparian resources in the field in accordance with the *Forest Practices Code*, rather than the older guidelines used in the analysis

In summary, I note that there are significant deficiencies in the riparian inventory and request that the licensee refine this information during the term of MP No. 9. For this determination however, I accept the information modelled as the best available and have made no adjustments to the base case on account of this factor.

- green-up and adjacency

To protect such resources as wildlife habitat, water quality and visually sensitive areas, the *Forest Practices Code* specifies limitations on cut block size and requires that adjacent cutblocks be "greened-up" before harvest is allowed. The objective of green-up and adjacency requirements is to distribute the harvest pattern and retain forest cover across the landscape. These requirements are commonly expressed in terms of the number of entries or "passes" required to harvest mature timber from the timber harvesting land base.

In addition to the Visual Quality Objective (VQO) zone (described below) and the Riparian Resource Management zone (described previously) the licensee delineated two adjacency zones: a "general" zone and an "enhanced" zone. In the base case, separate forest cover requirements were applied to these two zones. In a sensitivity analysis, the licensee showed that reducing the green-up height increased medium-term timber supply and enabled the initial base case harvest level to be maintained for an additional decade. By contrast, increasing green-up height reduces medium-term timber supply, however the initial harvest level can be maintained for at least one decade

I have reviewed the information and related sensitivities and have no evidence that suggests the zones and the assumptions used are not reasonable for use in the analysis. I therefore accept the information as modelled and appropriate for this determination.

- visually sensitive areas

Careful management of scenic areas near recreational sites, highways and lakes is an important IRM objective and is part of the BCFS mandate to manage the recreation resource. Procedures which incorporate both biophysical (e.g., slope, topography) and social factors have been developed to describe recommended visual quality objectives (VQOs). VQOs specify the amount of visible disturbance that is acceptable for a given area.

The recreation inventory for TFL 1 included an assessment of visually sensitive areas. This information was used to delineate three VQO zones ("preservation", "retention" and "partial retention") covering approximately 13 percent of the timber harvesting land base. In the base case, the licensee applied forest cover requirements to each of these VQOs including the 138 hectare preservation VQO zone. By definition, the preservation VQO zone does not contribute to timber supply and therefore should have been removed from the timber harvesting land base. While this may act to reduce timber supply compared to the base case harvest forecast, I note the affected area is relatively small—less than 0.1 percent of the timber harvesting land base. I therefore conclude that the accounting of visually sensitive areas was adequate for use in this determination.

- community watershed considerations

There is one designated community watershed within the TFL at Gitzyon Creek. The watershed supplies water to the community of New Aiyansh and covers 1496 hectares including approximately 400 hectares of the timber harvesting land base. No specific accounting for this watershed was made in the timber supply analysis.

I note the licensee's commitment to manage the community watershed in accordance with Forest Practice Code standards. While I acknowledge the area should have been modelled with forest cover requirements applicable to community watersheds, given the relatively small proportion of area involved (0.3 percent of the timber harvesting land base), I see no short-term risk to the base case harvest forecast. I have therefore made no further adjustments.

- biodiversity

Biological diversity, or biodiversity, is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, and the evolutionary and functional processes that link them. Under the *Forest Practices Code*, biodiversity in a given management unit is assessed and managed at the landscape and stand levels.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures across a

variety of ecosystems and landscapes. The *Biodiversity Guidebook* is based in part on the principle that maintaining such attributes and structures, together with connectivity of ecosystems and the maintenance of forested areas of sufficient size to maintain forest interior habitat conditions, will provide for the habitat needs of most forest and range organisms.

A major consideration in managing for biodiversity at the landscape level is leaving sufficient and appropriately-located patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests. Although some general forest management practices can broadly accommodate the needs of most species, more often a variety of practices is needed to represent the different natural disturbance patterns under which specific ecosystems have evolved. Natural disturbance types (NDTs) vary from frequent wildfires in the dry interior regions to rare stand disturbance events (e.g., wind) in the wetter coastal regions.

The delineation and formal designation of "landscape units" is a key component of a subregional biodiversity management strategy. A range of biodiversity emphasis options (BEOs) may be employed when establishing biodiversity management objectives for a landscape unit. The *Biodiversity Guidebook* outlines BEOs—lower, intermediate and higher. If a reasonable distribution of options is maintained across the land base, it is generally considered that biodiversity can be adequately maintained in conjunction with the timber harvesting objectives.

For areas where landscape units have not yet been formally established, or an emphasis option has not been assigned for a landscape unit, the *Biodiversity Guidebook* recommends the lower BEO be used as a default to guide operations pending establishment of landscape units and objectives. Current government policy intended to balance social and economic impacts against the risk to biodiversity stipulates that the eventual distribution of emphasis options within a sub-regional planning unit should include approximately 45 percent of the area within the lower, approximately 45 percent within the intermediate, and approximately ten percent within the higher BEO, consistent with the *1996 Forest Practices Code Timber Supply Analysis* report.

For TFL 1 draft landscape units have been proposed but have not been formally established by the Kalum Forest District Manager. For the purposes of the timber supply analysis, SCI divided the TFL into 13 Resource Planning Units (RPUs) as a proxy for landscape units. Because principles similar to those used to establish landscape units were applied, BCFS regional staff agreed with the approach.

The licensee assumed a distribution of biodiversity emphasis of 45 percent lower, 45 percent intermediate and ten percent higher biodiversity emphasis when determining the old seral stage requirement for each RPU. In the timber supply analysis, the licensee assumed application of the full old seral requirements as prescribed in the *Biodiversity Guidebook* throughout the forecast period including those stands in the low biodiversity emphasis areas. SCI compared the amount of productive area in the old seral condition to the minimum requirements identified in the *Biodiversity Guidebook* during the simulation

period. In the base case, old seral forest targets were met in all but one planning unit throughout the forecast.

I have reviewed the above information and have reasoned as follows. For the purposes of timber supply analysis, I conclude that the licensee's RPUs are based on an acceptable methodology and should provide a reasonable approximation of the future landscape units that will eventually be established on TFL 1. I note that in the absence of established landscape units the licensee applied the appropriate proportions of low, intermediate and high biodiversity emphasis to the RPUs. The analysis showed that the old seral requirements were met in all but one RPU sub-unit. However, I note that the deficiency represents only 38 hectares of the timber harvesting land base and therefore presents no significant risk to timber supply or meeting biodiversity requirements on the TFL.

I acknowledge that the licensee modelled biodiversity at the subzone, rather than the variant level as expressed by current government policy. However, additional investigation by BCFS staff confirms that for TFL 1, applying old seral requirements at the subzone level provides a reasonable approximation of biogeoclimatic variant and therefore presents no significant risk to the base case harvest forecast.

In summary, I conclude that the licensee has provided an adequate accounting of landscape-level biodiversity requirements and I accept the assumptions used in the base case for this determination. While the RPUs on TFL 1 represent a reasonable approximation of landscape units for the purposes of timber supply analysis, I note that operationally the licensee will be obliged to develop plans and strategies consistent with the ongoing completion and eventual management of landscape units. Once landscape units are formally established by the District Manager they can be incorporated into future analyses and determinations.

- *stand-level biodiversity*

Stand-level biodiversity is managed by retaining reserves of mature timber or wildlife tree patches within or adjacent to cutblocks to provide structural diversity and wildlife habitat.

On TFL 1 SCI defined Resource Planning Units (RPUs) to approximate future landscape units as discussed above. In the timber supply analysis, the licensee used the *Biodiversity Guidebook* to estimate the proportion of cutblock area required to accommodate stand level biodiversity in each RPU sub-unit. SCI appropriately adjusted these estimates to account for the contribution to stand-level biodiversity from riparian reserves and riparian management zones. BCFS Kalum District staff accept the approach used in the analysis and confirm it adequately reflects current operations on TFL 1. Having reviewed the analysis and the findings of District staff, I accept the assumptions used to account for stand-level biodiversity as modelled and have made no further adjustments.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber;

Kalum Land and Resource Management Planning (LRMP) process

The Kalum LRMP is one of 18 Strategic Land Use planning processes currently underway in British Columbia. Once completed, this plan will provide a set of recommendations and strategies that will direct management activities on all Crown land within the Kalum planning area for the next ten years.

Six resource management zones and a number of subzones have been recommended for the areas covered by phase one of the plan. These zones are based on common resource values (e.g., scenic viewscapes, wildlife and fish habitats, water quality), biophysical characteristics, resource issues or resource management directions. Phase two of the plan includes the area of TFL 1 and is expected to employ the equivalent zone categories. The zones are: "settlement", "agriculture", "intensive resource development zone", "general resource management zone", "sensitive resource development zone", and "protected areas". Specific strategies and objectives must be developed for each resource management zone, and general management principles defined for all resource values.

The final LRMP recommendations, including both phase one and phase two plans will be submitted to Cabinet for final approval in late 1999. Once the plan is accepted by government, all land use activities within the planning area must conform to the intent of these management directions, objectives and strategies. The government may declare all or portions of the Kalum LRMP as a higher level plan under the *Forest Practices Code*.

While 16 304 hectares within TFL 1 have been identified as a future protected area (as described above under *protected areas*) no decision has yet been finalized by government. Consistent with my guiding principles, I therefore cannot speculate on the final outcome of government strategic land use decisions, nor can I speculate on the impact on timber supply of eventual approved management practices within specific resource management zones. I acknowledge that completion and implementation of the LRMP may in future impact the timber supply of TFL 1 and am mindful that subsequent determinations for TFL 1 will reflect the completion and ongoing implementation of the LRMP.

Twenty-year plan

The main purpose of the 20-year plan is to show if the harvest volume projected in the base case can be spatially configured in specific areas on the landscape over the next 20 years. The Kalum Forest District Manager has approved the 20-year plan for use in the timber supply analysis. The plan shows that at the current AAC, there is sufficient flexibility in the spatial distribution of the cutblocks to integrate the needs of other resources and to support the base case harvest level for the 20-year period. I have reviewed the plan and find it acceptable for this determination.

Partitioned component of the harvest

The *Forest Act* provides for portions of an AAC to be specified as attributable to different types of timber and terrain in different parts of a TFL. Partitioning an AAC ensures that harvesting is appropriately distributed in forest types, operability classes, or distinct areas.

In MP No. 8, the licensee committed to harvest at least 150 000 cubic metres over the five year management plan period from areas classified as harvestable using non-conventional harvest systems. The intention was to provide SCI with an opportunity to demonstrate performance in the 14 782 hectares of these non-conventional areas on the timber harvesting land base. In addition, the licensee committed to harvest at least 20 000 cubic metres of cottonwood per year over the five year period.

Based on information provided by BCFS Kalum District staff confirming that the licensee has demonstrated acceptable performance in these areas, I see no need to partition the harvest on TFL 1 at this time.

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area;

Alternative harvest flows

The nature of the transition from harvesting old-growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large volumes of older forest often permits harvesting above the long-term levels without jeopardizing future timber supplies.

In the timber supply analysis, the licensee presented an even-flow harvest of 465 660 cubic metres per year. This alternative provides a stable timber supply with no medium-term reduction to timber supply below the long-term harvest level. However I am mindful that this alternative represents an approximate reduction of 35 percent to the initial harvest level in the base case.

For this determination, I accept the base case harvest forecast based on its indication of stable supply with gradual controlled change and consider it a suitable reference on which to base my determination.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities;

Timber processing facilities

SCI is an integrated Canadian forest products company specializing in the production of bleached pulp and lumber products. SCI currently operates a bleached kraft pulpmill in Port Edward south of Prince Rupert, and a sawmill in Terrace. The combined mill consumption of these two facilities is approximately 3 400 000 cubic metres per year. The wood supply from TFL 1 provides over 50 percent of the Terrace sawmill

requirements and 17 percent of the its pulpmill's fibre requirements. To supplement supply, additional log purchases are made from other company operations as well as private sources in the region. SCI also operates sawmills at Carnaby and Smithers, but these facilities do not process significant amounts of timber from TFL 1.

I note the significant contribution of the TFL 1 timber harvest to the licensee's operations, and have considered this in my determination.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia; and

Minister's letters and memorandum

The Minister has expressed the economic and social objectives of the Crown in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). I understand both documents to apply to TFL 1. They are consistent with the objectives stated in the Forest Renewal Plan and include forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

As discussed above under Intensive silviculture, SCI presently conducts limited commercial thinning on TFL 1. The licensee proposes a moderate expansion of the program but I see no reason to partition the harvest at this time.

The Minister's memorandum addressed the effects of visual resource management on timber supply. It asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. As discussed under *visually sensitive areas*, forest cover requirements for these areas were adequately modelled and I have made no further adjustments to the timber supply estimate from that projected in the base case.

Local objectives

The Minister's letter of July 28, 1994, states that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

The licensee took a number of steps to provide opportunities for public review of the draft statement of management objectives, options, and procedures (SMOOP); draft MP No. 9; and timber supply analysis including:

- advertising in local and regional newspapers;
- distributing information to municipal councils, First Nations groups, community organizations and government agencies; and,
- making the documents available for public viewing.

Although no written submissions from the public were received, the licensee made suitable efforts to encourage and collect public input. I have considered the general employment and community stability implications of TFL 1 in my AAC determination.

First Nations

TFL 1 includes areas identified in the Nisga'a Agreement-in-Principle (AIP). The AIP was issued jointly by the Government of Canada, the Province of British Columbia and the Nisga'a Tribal Council on February 15, 1996. The AIP includes provisions on forest resources, wildlife, fisheries, access, as well as environmental assessment and protection on "Nisga'a Lands". When the agreement is ratified, the Nisga'a will own all forest resources on Nisga'a Lands, an area which includes lands within TFL 1, and the North Coast, Nass and Kalum TSAs.

I note that completion of the Nisga'a Final Agreement would require the deletion of 87 706 hectares from TFL 1. As part of the timber supply analysis, and at my request,

SCI provided a timber harvest projection which illustrates one possible outcome of removing the Nisga'a lands from TFL 1. In the example simulation (depicted below), similar harvest flow criteria were applied to the non-Nisga'a component of the TFL as were used in the base case.

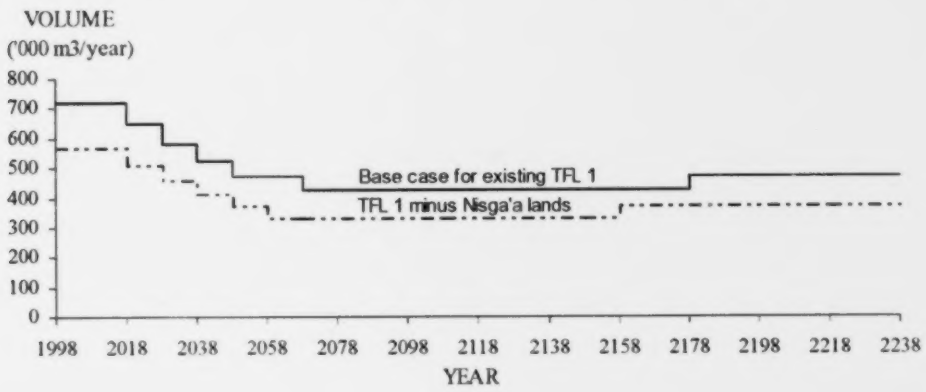


FIGURE 1: One possible harvest forecast for TFL 1 following deletion of Nisga'a lands

The analysis demonstrates that the non-Nisga'a lands on TFL 1 could potentially support an initial harvest level of 570 000 cubic metres per year. This harvest level could be maintained for two decades followed by a corresponding decline of ten percent per decade for five decades.

I note that this harvest forecast represents only one possible harvest scenario for the area that TFL 1 will encompass in the future. The appropriate level is a function of many variables including the existing composition and structure of the forest, current and future management objectives, harvest flow alternatives, and socio-economic considerations. While many alternative combinations of harvest flows are technically achievable, this analysis does provide me with one perspective of the potential impact on timber supply of withdrawing the Nisga'a Lands from TFL 1. However, while I am aware that other harvest flow options exist, until the Agreement is concluded, it is inappropriate for me to speculate on the final outcome of the decision and related harvest levels following the withdrawal of Nisga'a Lands from TFL 1.

I respect the Nisga'a people's desire to see the Final Agreement fully ratified. As described above in my "Guiding Principles", the AAC I determine for TFL 1 should in no way be construed as limiting the Crown's obligations with respect to the conclusion of this treaty process. Moreover, neither this timber supply analysis nor my associated determination prescribes a particular pattern of harvesting activity on TFL 1, including the area defined as Nisga'a Lands.

I acknowledge the intentions of both the federal and provincial governments to introduce settlement legislation aimed at concluding the agreement in the near future. When this legislation is passed and the final agreement implemented, I will re-evaluate the AAC for TFL 1.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Unsalvaged losses

Unsalvaged losses are timber volumes destroyed or damaged by natural causes such as fire and wind, and not recovered through salvage operations.

In the analysis, losses to wind were derived by prorating the estimates used in the adjacent Kalum TSA analysis (1996) since no data specific to the TFL were available. Using this approach, the licensee estimated unsalvaged losses on the TFL to be 4500 cubic metres per year, or approximately 0.6 per cent of the AAC under MP No. 8. According to the licensee, there have been no fires on TFL 1 nor is insect damage a significant factor. Other possible sources of loss may exist but are not apparent at this time.

For this determination, in the absence of better information, I accept the accounting for unsalvaged losses as modelled.

Reasons for decision

In reaching my decision on an AAC for TFL 1, I have considered all of the factors presented above and have reasoned as follows:

For the reasons stated above in "Timber supply analysis", and from reviewing the considerations as recorded above, I accept the licensee's base case as an adequate basis from which to assess timber supply for the purposes of this AAC determination.

In determining AACs, my considerations typically identify factors which, considered separately, indicate that the timber supply may be either greater or less than that projected in the base case. Some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision but cannot be reliably quantified at the time of the determination.

The following factor was identified as a reason why the base case underestimated timber supply to a degree that may be *quantified*:

- *proposed protected areas*: In deriving the timber harvesting land base used in the base case, the licensee excluded approximately 5862 hectares of productive forest in the Kitsumkalum watershed from contributing to the timber harvesting land base. While this area has been proposed as a future protected area through the Kalum Land and

Resource Management Planning (LRMP) process, until the decision has been finalized by government, I am unable to speculate on the outcome of the decision or the possible impacts on timber supply. I concluded that the base case harvest forecast is underestimated by approximately one percent.

An additional factor was identified as a reason why the base case underestimated timber supply to a degree that is *unquantified*:

- *site productivity estimates:* The licensee provided a sensitivity analysis to show the impact on timber supply of applying old-growth site index (OGSI) adjustment equations to all stands older than age 140. The analysis suggested potential increases in the medium- and long-term timber supply of 24 and 11 percent respectively compared to the base case harvest forecast.

Opposing the above influences, one factor was identified as a reason why the base case may have overestimated timber supply to a degree that is *quantified*:

- *TFL area adjustment:* A recent review of the TFL area by BCFS and SCI staff suggests that the area used in the analysis does not exactly match the area derived from the existing legal description of TFL 1. Based on a preliminary assessment of the variance, I reasoned that the area used in the analysis may be overestimated by up to 4191 hectares or 0.7 percent of the total TFL area.

Two additional factors were identified as reasons why the base case may have overestimated timber supply to a degree that is *unquantified*:

- *existing stand yields:* VDYP-generated yield tables were used to estimate the volume of existing stands on TFL 1. For some stands over age 60, volumes were not adjusted downwards to reflect the audit-generated volumes. Taking guidance from a sensitivity analysis provided by the licensee, I concluded that the base case harvest forecast may be overestimated by an uncertain but small amount in the medium-term.

- *identified wildlife:* the licensee presented limited accounting for the impacts of identified wildlife habitat in the base case harvest projection. Because of a lack of specific habitat mapping for identified wildlife species, I concluded that their habitat requirements may be inadequately addressed. Consistent with current provincial policy on identified wildlife, it is likely the base case harvest forecast has been overestimated by up to one percent with respect to this factor.

I acknowledge that there may be some uncertainty in the factors identified above, but when considered in isolation, none of the downward factors indicates a need to consider reducing the initial harvest level from that projected in the licensee's base case. Moreover, the potential impact of applying OGSI adjustments to site productivity estimates represents a significant upward medium- and long-term influence on the base harvest forecast by an amount which is significantly greater than the sum of all other influences combined. While uncertain, I note that results from provincial studies support the assertion that site productivity of older stands—including those on TFL 1—may

indeed be underestimated. More extensive investigations specific to this unit will clarify this uncertainty and can be incorporated into future determinations.

I again acknowledge the Nisga'a Agreement-in Principle and the potential future impact on TFL 1 should it be ratified. When the Agreement-in-Principle is concluded and implemented, I will reexamine the AAC for TFL 1.

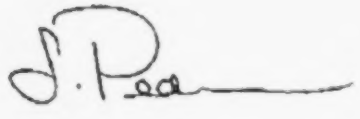
Determination

In summary, my considerations confirm that over the short-term the base case harvest forecast presented by the licensee can be achieved. Having considered and reviewed all the factors documented above, it is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that provides for requirements of the *Forest Practices Code* as they are currently implemented, that ensures integrated resource management objectives can be met, and that meets provincial objectives and that avoids disruptive shortfalls in future timber supply can best be achieved in this TFL at this time by maintaining the AAC at 720 000 cubic metres.

Implementation

This determination is effective February 23, 1999, and will remain in effect until a new AAC is determined, which must take place within five years of the date of this determination. In the period following this determination and leading to the subsequent determination, I request that the licensee perform the following:

- thoroughly review and revise the riparian inventory for TFL 1;
- investigate and clarify the approach used to model NSR areas on the TFL; and,
- in cooperation with BCFS Resource Tenures and Engineering Branch staff, review the boundaries and area of the TFL, and clarify any discrepancies with the legal description prior to the next determination.



Larry Pedersen
Chief Forester

March 4, 1999

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

8. Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest agreement areas and woodlot licence areas, and
(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or
(b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and
(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area,
(b) different types of timber and terrain in different parts of private land within a tree farm licence area, and
(c) gains in timber production on Crown land that are attributable to silviculture treatments funded by the government of British Columbia, the federal government, or both.

(6) The regional manager or district manager must determine a volume of timber to be harvested from each woodlot licence area during each year or other period of the term of the woodlot licence, according to the licence.

(7) The regional manager or the regional manager's designate must determine a volume of timber to be harvested from each community forest agreement area during each year or other period, in accordance with

(a) the community forest agreement, and
(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,
(ii) the expected time that it will take the forest to become re-established on the area following denudation,
(iii) silviculture treatments to be applied to the area,
(iv) the stand of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in the Province;
(b) manage, protect and conserve the forest and range resources of the Crown, having regard to the immediate and long term economic and social benefits they may confer on the Province;
(c) plan the use of the forest and range resources of the Crown, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the Crown and with the private sector;
(d) encourage a vigorous, efficient and world competitive timber processing industry in the Province; and
(e) assert the financial interest of the Crown in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996